

## **SPECTROSCOPY AND REACTIVITY OF MINERAL ANALOGS OF THE MARTIAN SOIL**

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In order for exobiologists to gain a better understanding of the similarities and differences between the early environments on Earth and Mars, and thus to answer a primary question in comparative planetology as to why life developed on earth to its rather complex level and why, apparently, this did not occur on Mars, the geochemical and physical aspects of the martian soil must be studied and elucidated. The martian soil participates in present day surface-atmosphere interactions, volatile balances, and geological land forming processes. The soil holds important clues to the processes that shaped the early geological history of Mars, to the amount of liquid once present, and to the possibility of early evolved life or existing life on the planet.

Some of the "best" Mars analog mineral models of the soil have been prepared and justified according to known constraints of chemical composition, reflectance spectroscopy and chemical reactivity. Detailed laboratory reflectance spectra in the UV/VIS/NIR (.30-2.5  $\mu\text{m}$ ) and IR (2.5-25  $\mu\text{m}$ ) regions have been obtained for the pure candidate minerals and some analog mixtures and compared to Mars reflectance spectra. Modeling of the reflectance spectra from optical constants determined for the analog minerals has begun and will be interpreted in terms of the effects of particle size variation, component mixing, and soil packing upon remotely sensed reflectance spectra. This has implications not only for Mars, but for other planets and planetoids. The ratio of Fe(II)/Fe(III) in the martian soil analog materials on spectral reflectance in the visible range has begun, and the results will be evaluated according to conformity with the visible Mars reflectance spectrum. Some initial LR and GEX data have been collected for the mineral samples and their mixtures which can be compared to the Viking data and interpreted in terms of the redox (Fe(II)/Fe(III) environment.